



Title of the Invention

Wireless Display System Operable in Power Saving Operation Mode
and Method of Controlling the System

5 Field of the Invention

The present invention relates to a wireless display system having a computer and a portable data terminal equipped with an inputting unit and a displaying unit (referred to as a wireless display hereinafter), where the computer is remotely controlled by the wireless display over wireless communications.

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Background of the Invention

As the computer technologies for a hardware and software have significantly been advanced, most of portable data terminals have a 15 performance and mobility improved. The portable data terminals are now widely used by a mobile business person, and used for novel application proposed day by day.

The portable data terminal is hence required to reduce their overall dimensions and weight and particularly improve and enhance a power-20 saving function, i.e., a less energy consumption. Saving the power consumption contributes reducing a battery size, thus reducing both an overall size and a weight of the portable data terminal.

The power saving function may be interpreted by developing a standby state where a power is consumed as little as possible, hence being traded off 25 with a utility. Pursuing the power saving too much makes an activated state and the standby state be switched frequently and creates some drawbacks such as a delay of a response and an intricate operation shifting

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from the standby state to the action state. The power saving hence requires to determine shifting conditions and power saving levels.

Shifting to the power saving operation mode may be implemented by a power switch of the data terminal operated by a user or by monitoring a non-operation period more than a specified one.

As Japanese Patent Laid-open No.10-133788 discloses, upon being informed that a portable data terminal is turned off, a host computer turns off the computer itself and then shut down an entire system, thus exhibiting a most power saving effect.

Above prior art allows the shifting to the power saving operation mode automatically conducted without any troublesome operation. Both the portable data terminal and the computer are completely turned off and thus reduce the power consumption. However, the user needs to shift the power saving operation mode back to the ordinary operation mode with a user's deliberate operation.

Summary of the Invention

A wireless display system has a computer and a wireless display wireless-communicating with each other. The computer includes an object event registering/monitoring unit for specifying and monitoring a particular event such as receiving a mail or a certain time on a schedule. The wireless display is notified of that the event occurs. Upon receiving the notice of the event, the wireless display shifts back from a power saving operation mode to an ordinary operation mode where the display is enabled to display data and input data.

The wireless display may monitor an operation through a touch panel unit. If data does not enter a predetermined time, the display judges that a

user stops operating the wireless display, and then, the wireless display stops supplying a power to a display screen and shifts from the ordinary operation mode to the power saving operation mode.

Thereby, the system reduces the power consumption with the power
5 saving operation and further, enables the user to start to use the portable
data terminal immediately corresponding to the event without any operation
by the user.

Brief Description of the Drawings

10 Fig. 1 is a schematic diagram of a wireless display system according to
an exemplary embodiment of the present invention.

Detailed Description of the Preferred Embodiment

Fig. 1 is a schematic diagram of a wireless display system according to
15 an exemplary embodiment of the present invention. As shown in Fig. 1, a
wireless display system 100 includes a computer 200 and a wireless display
300.

The computer 200 includes a display unit 201, a wireless-
communication unit 202, an application software unit 203, and an object
20 event registering/monitoring unit 204.

The display unit 201 is a display of the computer for displaying data in
text or graphic forms created in the computer operated by the user.
Because the user can acquire the data on the wireless display 300, the
display unit 201 may not be implemented by a physical device but a logic
25 block.

The wireless-communication unit 202 receives the data and converts
the data to be displayed on the display unit 201 into a protocol form operable

in the wireless display. The protocol form of the data is transferred over a wireless-communication to the wireless display 300. It is preferable that the data to be displayed on the display unit 201 stored in a memory (a graphic memory) is extracted with a hardware method. The whole
5 extracted data may not be transferred to the wireless display 300. The system further includes a memory temporarily storing data to be previously displayed, and the computer sends only a difference of the data between the data and data to be previously displayed, and thus reducing data to be transferred. Moreover, the data may be extracted with a system service
10 presented by an OS (for example, BitBlt readout in the Windows) in which data at a specified position on a screen is extracted, and the data. The service exhibits a slow operating speed but allows the circuitry arrangement for accessing the graphic memory with the hardware method to be simplified, hence contributing to reducing a cost.

15 The application software unit 203 is equivalent to a memory device where processing programs of the computer 200 is stored and thus generates events in response to external demands. The application software unit 203 includes two processing programs: a program for transmitting and receiving Internet mails over a communication network such as a cable LAN or a
20 public telephone network; and a schedule management program for notifying a user of a schedule by data displayed at a scheduled time on the display unit 201.

25 The object event registering/monitoring unit 204 specifies at least one of two events, i.e., receiving a mail and notifying a schedule, and monitors whether or not the specified event occurs in the application software unit 203. When the event occurs, the unit 204 constructs a protocol form of the data operable in the wireless display 300, delivers the form to the wireless-

communication unit 202, and instructs the unit 300 to transmit the form.

The wireless communication unit 202, when being instructed by the object event registering/monitoring unit 204, transmits the protocol form of the data to the wireless display 300. The wireless-communication unit 202 also receives protocol data regarding an operation (a click operation and a position on the touch panel unit) from the wireless display 300 and analyzes the data. The data is simulated as a control operation of a pointing device such as a mouse.

The wireless display 300 includes a wireless-communication unit 301, a display unit 302, and a touch panel unit 303.

The wireless-communication unit 301 transmits a protocol data regarding an operation (a click operation and a position on the touch panel unit) received from the touch panel unit 303. The wireless-communication unit 301 monitors receiving the protocol data of the operation from the touch panel unit. When receiving no data for a certain time, the unit 301 judges that the user stops using the wireless display and turns off the display unit 302, thus shifting the wireless display 300 to the power saving operation mode.

The wireless-communication unit 301 also receives protocol data to be displayed from the wireless-communication unit 202 of the computer 200. After analyzing the data, the unit 301 transfers them to the display unit 302. The wireless-communication unit 301 receives protocol data of events from the wireless-communication unit 202 and analyzes the data. When receiving the data while the display unit 302 is in the power saving operation mode, the unit 301 turns on the display unit 302 and instructs the display unit 302 to display the data from the computer again.

The display unit 302 receives and displays protocol data of the display

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unit 201 sent from the wireless-communication unit 302.

The touch panel unit 303 is a transparent film-like input device for a pointing operation and a position of the operation by a user and is mounted on the display unit 302. The touch panel unit 303 is operated by the user, and then, the operation (a click operation and a position on the touch panel unit) is converted into protocol data and then transferred to the wireless-communication unit 301.

The operations described above can practically be carried out by programs operable in the computer 200 and the wireless display 300.

According to the embodiment of the present invention, the wireless display of a portable data terminal automatically shifts back from a power saving operation mode to an ordinary operation mode without any operation by a user depending on events which occur asynchronously and uncertainly in a computer.